LEDs **110** employed in a great number result in higher costs, posing difficulty to manufacture of the backlight unit.

[0061] Therefore, in the present embodiment, the white LEDs **110** are arranged such that the LED unit U has a light amount in the center C set to the aforesaid range, thereby obtaining optimal uniformity.

LCD Backlight Unit Having a Surface Light Source Using White LEDs

[0062] The surface light source as described above may be employed in an LCD backlight unit backlighting an LCD panel in an LCD.

[0063] Hereinafter, the LCD backlight unit having a surface light source using white LEDs will be described with reference to FIG. **5**.

[0064] FIG. **5** is an exploded side sectional view illustrating an LCD backlight unit having a surface light source using white LEDs.

[0065] As shown in FIG. **5**, according to the present embodiment, the LCD backlight unit **200** disposed behind an LCD panel **270** includes a board **210**, a reflective plate **220** disposed on the board **210** and a surface light source including white LEDs **110**. The reflective plate **220** reflects light emitted from the white LEDs **110** upwards.

[0066] The surface light source is disposed on the reflective plate **220**. As described with reference to FIGS. **3** and **4**, the plurality of white LEDs **110** are arranged at a predetermined distance from one another. The white LEDs **110** are arranged by adjusting spacing D_1 of columns, spacing D_2 of rows D_2 or arrangement angles θ thereof. Here, the white LEDs **110** are arranged such that a light emitting diode unit U defined by each of the white LEDs **110** and corresponding ones of the white LEDs disposed at a closest distance from the each white light emitting diode has a central light amount ranging from 80% to 120% with respect to an average light amount of the white LEDs.

[0067] A side wall **230** is formed at an edge of the reflective plate **220** to surround the white LEDs **110**. The side wall **230** has an inclination surface **235**. Here, the inclination surface **235** of the side wall **230** may be additionally applied with a reflective material to ensure light emitted sideward from the white LEDs **110** to be directed upward.

[0068] A diffusing sheet **240** is provided on the surface light source to uniformly diffuse light incident from the surface light source, thereby preventing light from being concentrated locally.

[0069] A light collecting sheet **250** is disposed on the diffusing sheet **240** to collect the light diffused from the diffusing sheet **240** in a direction perpendicular to the LCD panel **270**.

[0070] Here, a protective sheet **260** may be further disposed on the light collecting sheet **250** to protect an underlying optical structure. The protective sheet **260** serves to protect a surface of the light collecting sheet **250** while contributing to uniform distribution of light.

[0071] An LCD panel **270** is disposed on the protective sheet **260**. The LCD backlight unit **200** of the present embodiment irradiates uniform white light onto the LCD panel by virtue of the surface light source using the white LEDs **110**, thereby ensuring a clear LCD image.

Separately Driven LCD Backlight Unit

[0072] The arrangement of the white LEDs described above is applicable to a separately driven LCD backlight unit.

[0073] In the present embodiment, the board **210** may be a conductive board where at least one first connector and a plurality of second connectors are formed to enable flow of positive and negative currents. The separately driven LCD backlight unit includes a plurality of white LED modules mounted on the conductive board to be arranged in a matrix having an m number of rows and an n number of columns, where m and n are positive integers of at least two. The m×n number of LED light sources are defined into a plurality of blocks. The plurality of blocks are connected to the first and second connectors to independently drive the white LED chips based on each of the blocks.

[0074] In the connector configuration for separate driving, the blocks are commonly connected to the first connector and the second connectors are identical in number to the blocks of each of the modules. The plurality of blocks are connected to the second connectors, respectively.

[0075] In the separately driven LCD backlight of the present embodiment, the number of LED modules, the number of blocks of the LED module and/or the number of the white LED chips in the each block may be adequately adjusted to ensure an appropriate number of LED chips and arrangement for attaining light amount necessary for the separately driven LCD backlight unit.

[0076] The number of the LED modules may be 2 to 28, the number of the blocks may be 1 to 28 for the each module and the number of the white LEDs may be 2 to 240 for the each block.

[0077] Particularly, in a case where the LCD backlight unit is utilized in a 40-inch LCD, the LED module may include 1 to 14 blocks. In a case where the LCD backlight unit is used in a 46-inch LCD, the LED module may include 1 to 15 blocks. Given the assumption that an active area of the 46-inch LCD TV is 1020×580 mm, when the number of the LEDs for the each block is 2 to 240, a total 4 to 100800 of LEDs will be employed.

[0078] Meanwhile, in a larger-sized backlight unit, the number of modules may be increased to employ a necessary number of LED chips easily. Specifically, the LED module may include 1 to 28 blocks and 2 to 240 white LEDs may be arranged in the each block of the LED modules.

[0079] Notably, in a case where the LCD backlight unit is utilized in a 52 inch LCD, the number of the LED modules may be 4 to 12. Also, in a case where the LCD backlight unit is adopted in a 57 inch LCD, the number of the LED modules may be 6 to 20.

[0080] As shown in FIG. **7**, an LCD backlight unit **300** according to an exemplary embodiment of the present invention includes four LED modules **320**. Each of the LED modules **320** includes a conductive board **311**, and a plurality of LED chips **310** mounted on the conductive board **311**. The LED chips **310** are white LEDs arranged in a matrix having four rows and nine columns.

[0081] The LED module **320** may be defined into six blocks B**1** to B**6**. In the present embodiment, the blocks B**1** to B**6** constituting the LED module **320** serve as respective units which can be driven independently.

[0082] As in the present embodiment, the LED chips **310** in each of the blocks B**1** to B**6** may be connected in series with one another. Here, the each block B**1** to B**6** as a circuit has at least one end connected to an individual connector so that the LED chips **310** can be separately driven based on the respective units.